Presentation Abstract

Program#/Poster#: 78.02/U35

Presentation Title: Modifying the discrete sequence production task for a multi day tDCS study in young and older adults

Location: Hall A

Presentation time: Saturday, Oct 17, 2015, 1:00 PM - 5:00 PM

Presenter at Poster: Sat, Oct. 17, 2015, 2:00 PM - 3:00 PM

Topic: ++F.01.c. Human learning: Motor and sequence learning

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Abstract: The discrete sequence production (DSP) task is an explicit motor learning sequence task where two 6-item sequences are presented one item at a time. Over many repetitions, participants eventually execute a 6-item sequence as 2 or more segments, an indication of distinct motor chunks. Previous work has demonstrated that older adults exhibit a reduction in chunk length and have an impaired explicit memory, relative to young adults. Right and left dorsolateral prefrontal cortex (DLPFC) have been demonstrated to be involved in early explicit sequence learning as well as early adaptation. Primary motor cortex (M1) has been shown to be involved in explicit sequence learning and retention. Further, premotor cortex has been shown to be involved in memory consolidation in sequence learning. Here, we use transcranial direct current stimulation (tDCS), a non-invasive form of brain stimulation, to facilitate early learning and chunking in both younger and older adults in a truncated version of the traditional DSP task. Participants attend three sessions over the course of a week, and are randomized into one of five tDCS conditions (right DLPFC, left DLPFC, M1, premotor, or sham). Over the three sessions, participants complete a battery of cognitive and motor tasks that correlate with motor learning ability and executive functioning in order to characterize the participant, use later as covariates in analysis, and understand how these cognitive and motor tasks might change from baseline as a function of the tDCS condition. Participants also practice the DSP task.
while receiving tDCS for up to 25 minutes during sessions 1 and 2. During session three, participants are tested on their ability to remember the sequence of the DSP task without stimulation. We hypothesize that tDCS to right DLPFC will facilitate early learning in both older and younger adults, with older adults receiving the most benefit from the tDCS stimulation. We also predict that tDCS over premotor cortex will help facilitate chunking in older adults, relative to older adults in the sham group. We expect that stimulation to M1, left DLPFC, and premotor in younger adults will change the rate of motor learning relative to young adults in the sham tDCS group. Our preliminary results suggest that younger adults without tDCS are still able to chunk with fewer trials in the DSP task over three sessions.

Disclosures:  
**B. Greeley:** None. **J. Barnhoorn:** None. **W. Verwey:** None. **R. Seilder:** None.

Keyword(s):  
Sequence Learning  
MOTOR LEARNING  
tDCS

Support:  
NSF

2:00 U30 77.18 Changes in brain melanocortin system with calorie restriction-induced adaptive thermogenesis and suppressed physical activity. S. MUKHERJEE*; S. L. BRITTON; L. G. KOCH; C. M. NOVAK. Kent State Univ., Univ. of Michigan Med. Sch., Kent State Univ.

3:00 U31 77.19 Metabolic glucose, insulin and leptin circadian rhythms are altered by perinatal cafeteria diet in rats. D. J. BUSTAMANTE-VALDEZ; P. DURAN*. Facultad De Ciencias, UNAM.

4:00 U32 77.20 Brain glycogen fuels the exercising brain to maintain endurance capacity. T. MATSUI*; H. OMURO; Y. LIU; T. SHIMA; M. SOYA; M. HAMASAKI; S. MIYAKAWA; H. SOYA. Univ. of Tsukuba.

1:00 U33 77.21 Role of TRPV4 in prediabetic obese peripheral nerve. C. AVOUNDJIAN; B. COOPERMAN; L. R. BANNER*. California State Univ. Northridge.

POSTER

078. Motor and Sequence Learning

Theme F: Cognition and Behavior

Sat. 1:00 PM – McCormick Place, Hall A

1:00 U34 78.01 Implicit motor learning in the absence of sensory-prediction errors. D. GRAEUPNER*; P. A. BUTCHER; J. A. TAYLOR. Princeton Univ., Princeton Univ.

2:00 U35 78.02 Modifying the discrete sequence production task for a multi day tdcs study in young and older adults. B. GREELEY*; J. BARNHOORN; W. VERWEY; R. SEILDER. Univ. of Michigan, Univ. of Michigan, Univ. of Twente, Univ. of Michigan, Univ. of Michigan.

3:00 U36 78.03 Fine motor control is associated with individual fitness level in older adults. C. VOELCKER-REHAGE*; L. HUEBNER; B. GODDE. Jacobs Univ. Bremen, Technische Univ. Chemnitz.

4:00 U37 78.04 Motor plasticity in assembly-line workers: Effects of repeated work task changes on manual dexterity and related brain function. B. GODDE*; J. OLMANNS; C. VOELCKER-REHAGE; U. M. STAUDINGER. Jacobs Univ., Columbia Aging Ctr.

1:00 U38 78.05 Task-related alpha power during a fine motor control task in young and older adults. L. HUEBNER*; B. GODDE; C. VOELCKER-REHAGE. Jacobs Univ. Bremen, Technische Univ. Chemnitz.

2:00 U39 78.06 A cognitive framework for explaining serial processing and sequence execution strategies. W. B. VERWEY*; C. H. SHEA; D. L. WRIGHT. Univ. of Twente, Texas A&M Univ.

3:00 U40 78.07 Age effects on the transfer of sequence knowledge between different types of movements. J. S. BARNHOORN*; F. DÖHRING; E. H. F. VAN ASSELDONK; W. B. VERWEY. Univ. of Twente, Saarland Univ.

4:00 U41 78.08 Age related differences in scheduling observational and physical practice. F. DÖHRING*; S. PANZER. Saarland Univ.

1:00 U42 78.09 Functional Connectivity patterns in the cerebellar-thalamic-cortical network predicts retention in locomotor adaptation. L. SHMUEL*; S. BAR-HAIM; F. MAWASE. Ben-Gurion Univ. of the Negev, Ben-Gurion Univ. of the Negev, Ben-Gurion Univ. of the Negev, Johns Hopkins Univ.

2:00 V1 78.10 Error estimation training enhances motor learning in older adults. Y. CHEN*; M. KWON; A. CASAMENTO MORAN; M. W. BEIENE; B. G. GRUBBS; F. T. FIOI; K. GAUGER; E. A. CHRISTOU. Univ. of Florida.


4:00 V3 78.12 The influence of biomechanics and cognitive demands on locomotor sequence learning. G. BORIN; J. T. CHOI*. Univ. of Massachusetts Amherst.

1:00 V4 78.13 Transfer of sequence-specific and non-specific motor skills after constant and variable training. D. M. MUSSIGENS*; F. ULLÉN. NINDS, Karolinska Institutet.

2:00 V5 78.14 Explicit knowledge in a motor sequence depends on strategy. M. JAYNES*; M. SCHIEBER; J. MINK. Univ. of Rochester Med. Ctr.


4:00 V7 78.16 Changes in NREM2 sleep spindle frequency play a causal role in motor sequence learning consolidation. S. LAVENTURE*; S. FOGEL; G. ALBOUY; O. LUNGU; C. VIEN; P. SÉVIGNY-DUPONT; C. SAYOUR; J. CARRIER; H. BENALI; J. DOYON. Univ. De Montreal, Univ. of Western Ontario, Katholieke Univ. Leuven, Univ. Pierre-et-Marie-Curie.


2:00 V9 78.18 The impact of predictability on implicit motor and perceptual sequence learning. L. KATZ; B. FLYNN; C. SINGH; C. SEMERJIAN; L. IZRAYLOV; M. MALABANAN; J. CUDIA; L. H. LU*. Roosevelt Univ.